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(54) Title: SYSTEM AND METHOD FOR DELIVERING ELECTRONIC MESSAGING TO MOBILE PHONES

(57) Abstract

A system and method for delivering to a digital mobile phone notifications of e–mail or v–mail, or both of them, and for delivering e–mail summaries or v–mail summaries, or both of them, and which makes it possible for a user to configure all of his or her e–mail (and preferably also v–mail) account delivery options from a single location on the world–wide web. The e–mail messages delivered to the phone are in a "summarized" form consistent with the message length limit and typically small display of a phone. The system does not interfere with existing e–mail or v–mail accounts but delivers to a user, via his or her digital phone, a notification that an e–mail (or v–mail) message is waiting for the user, along with some basic information (in the case of e–mail) about the message such as the identity of the sender, the time the message was sent, the subject and a truncated version of the main text. The user can retrieve the full message, with attachments, when access to an appropriate communications device is available. Alternatively, the user may call in to an interactive voice response server which is interfaced to the e–mail forwarding system, to obtain text–to–speech playback of e–mail messages. Optionnally, the user may then dictate an immediate response to the IVR server which is then returned to the sender as a voice file attachment in a reply e–mail.

SYSTEM AND METHOD FOR DELIVERING ELECTRONIC MESSAGING TO MOBILE PHONES

Field of the Invention

This invention relates to the field of messaging and, in particular, to delivery of electronic messages (including e-mail and voice mail or notifications thereof) to mobile digital telephones.

Background

Electronic messaging, particularly electronic mail (e-mail) and voice mail (v-mail) systems have in recent years grown into widespread use. Voice mail is now a ubiquitous feature of business telephone systems. With the growth in popularity and inexpensive accessibility to the global computer interconnection network known as the Internet, many businesses, organizations and individuals have come to utilize e-mail for a great deal of their interactions with others. Moreover, due to the usually fast (not to mention inexpensive) delivery of e-mail, this medium is at times a preferred vehicle when one has as an objective making a speedy contact with another person. This does not always work out well, however, as a user may have multiple e-mail accounts and may not check all of them frequently. Consequently, an e-mail message that the sender views as urgent may not be read by the addressee for some time. Sometimes it is the receiver who views a message as urgent, even more so than the sender. For example, the receiver (e-mail account holder) may be trying to obtain business from a customer or potential customer and may wish to establish a strong impression of responsiveness and accessibility. Yet when the receiver is away from his computer (e-mail access device), an e-mail message may languish in his In box for a time longer than he would prefer. In some situations, e-mail users have turned to portability solutions such as using e-mail accounts hosted by companies that allow message retrieval using a browser on the world-wide-web (www or "the Web"). That allows access to one's e-mail from any Internet-connected computer. In recent months, portable devices have begun to be marketed, also, which allow wireless access to the Web. These devices also can be used to check such e-mail accounts. Such solutions are expensive, however, and require the e-mail subscriber to take active steps to check his or her e-mail account, and only provide benefits to those whom e-mail boxes can be read from the Web; this precludes

many uses of corporate or institutional e-mail systems.

Telephone contact has even longer been a preferred mode of communication when an immediate or speedy contact is desired or needed. With the advent of mobile telephony, including analog and digital mobile services such as cellular telephone systems, immediate access is available to telephones for both receiving and initiating calls. Analog and digital mobile telephones are fast becoming ubiquitous. Many digital telephones, particularly those based on GSM and PCS standards, are capable of reviewing SMS text messages on a channel separate from that used for voice communication and have displays capable of outputting those text messages. Some wireless telephone services take advantage of these text display capabilities and provide text messaging services that allow a party who wishes to send a text message to such a telephone to do so either via a Web site on the global Internet or by providing each such telephone with an Internet address (URL) and transmitting text-length-limited e-mail messages for that URL to the corresponding telephone. A protocol, called the Short Messaging Service, SMS, has been adopted as a standard by which such e-mail messages may be transmitted. Typically, SMS messages are limited to 110 - 160 characters in length; longer messages are truncated automatically to that length or are refused. Often, it would be desirable to be able to send and have the user (subscriber) receive the full text of a longer message even when the user is away from his or her computer, but this is not currently possible. In the future, digital phones may be provided with more memory capacity and the limit may be lengthened on SMS-type text messages but there will still be older phones in use which will have current message length limitations. Moreover, there is likely still to be some limit on the amount of text a phone will be designed to accept and there will sometimes be longer messages a sender will want to send and a phone user will want to be able to receive.

Some Internet service providers (ISP's) and some e-mail client programs will allow an e-mail account holder to set up an e-mail account to forward received messages to another e-mail address. This other e-mail address could be the e-mail address of a suitable digital phone (i.e., one registered with a carrier that provides e-mail (text) messaging services to its phone customers). Such forwarding operation usually and preferably will transmit a copy of the original message, while leaving the original message in the originally-indicated mailbox designated by the sender. Not all ISP's and not all e-mail client programs, however, permit the account-holder to forward received e-mail messages. When a user's e-mail client program does not provide forwarding capability, the

user can only forward e-mail if his or her ISP provides a forwarding service. However, most ISP's are not set up to provide user-customized e-mail forwarding services. Therefore, when an ISP does provide e-mail forwarding services, to configure or reconfigure a forwarding arrangement the user may have to contact the ISP and have the ISP set up the desired arrangement. This may, of course,

5   involve some amount of delay and inconvenience. A number of e-mail client programs, such as Novell's GroupWise programs, provide utilities which permit a user to "filter" e-mail for forwarding. That is, the user may establish rules against which e-mail messages are screened; only messages satisfying the rules are forwarded. Typically, rules may be established to screen e-mail based on the identity of the sender, characters in the subject field, characters in the body of the message, a

10   message status (e.g., urgency), among other possibilities. Unfortunately, even when an ISP makes available a forwarding service, it may not allow selective forwarding of messages (i.e., rules-based forwarding) and may thus be made effective only for all (or none) of the user's messages even if the user would desire that only a limited class of messages be forwarded. This is a problem for at least two reasons. First, the user may receive a large volume of e-mail but only a few messages may be

15   important enough for the user to be concerned about them while away from his computer. Forwarding too much e-mail has the potential to annoy the user and may lead to the user failing to pay attention to and distinguish an urgent message. Forwarding no e-mail, as an alternative, may deprive the user of an important opportunity to receive and act on a message. Second, the user may have to pay for forwarded messages on some traffic-dependent basis. If the user has multiple e-mail

20   accounts, her problems are compounded. She must go through similarly involved steps to configure and re-configure the desired forwarding activity for each account, and the forwarding of undesired messages may lead to significant undesired and unnecessary expense. No prior system is known to exist which allows a user himself to configure one or more e-mail accounts for forwarding to the user's personal mobile digital telephone even in the absence of a forwarding-capable e-mail client

25   program. Moreover, no such system is available which allows the user to configure ISP e-mail accounts for selective forwarding and to configure multiple accounts at one time, avoiding repetitious action.

Thus we recognize a need for a system that will, preferably selectively, forward e-mail, or at least notifications of e-mail, from multiple accounts to a designated digital phone. Desirably, such a

30   system will allow a user to have a large degree of at-will control over the selection of messages

which are forwarded, to manage both cost and annoyance factors. Thus, it may be desired, for example, at one time, that only messages from designated senders or relating to designated subjects or marked urgent be forwarded and that other messages not be forwarded. At another time, the user may choose to forward or not forward messages based on completely different criteria. Further,

5   such a system desirably would allow multiple e-mail accounts to be managed (i.e., have their forwarding configured) in a consolidated (and perhaps consistent) manner. All of this would occur without disturbing the user's e-mail account and mailboxes.

Aside from e-mail, the other most common form of electronic messaging today is voice mail. Unlike e-mail, which may be forwarded in the manners discussed above, office v-mail

10   systems typically provide no forwarding operation, though they are remotely accessible for messages retrieved whenever the user decides to check for messages. Thus a v-mail user usually has to call in to check for messages if she is away from her office. However, the user has no way of knowing whether there are any messages waiting, so she has to take time and possibly incur expense to check for messages even when there may be none. An urgent message may receive no attention

15   for a substantial time if the called party (i.e., the v-mail user) does not check for messages for that time. This might result in a personal or professional problem for the calling or called party. Partly for this reason, paging services have become very popular, allowing either data or voice paging to a paging service customer who carries a pager. Typically, however, a calling party who fails to reach a called party at his or her telephone will have to place a separate call to a separate telephone

20   number, assuming that number is known to the caller, to page the called party. If a voice page is left, it is maintained separate from the called party's v-mail and is not accessible through the called party's v-mail system. Moreover, many telephone users, including mobile phone users, do not subscribe to paging services. Carrying both a pager and a digital mobile phone is cumbersome and requires two separate accounts, often with two separate companies. Carrying a pager, digital mobile

25   phone, and wireless hand-held computer with Web access is even more cumbersome and expensive.

Summary of the Invention

It would be desirable, therefore, to be able to use a mobile phone as a multi-purpose communications device, to accept and deliver both e-mail and v-mail to the user, or at least

30   notifications of same, and to function in a variety of modes to facilitate communication.

Accordingly, there is provided a system for delivering notification of e-mail or v-mail, or both of them, and for delivering e-mail summaries or v-mail summaries, or both of them, and which makes it possible for a user to configure all of his or her e-mail (and preferably also v-mail) account delivery options from a single location on the world-wide web, for delivery to a digital mobile

5   telephone, while leaving intact the user's existing e-mail and v-mail services. The e-mail messages delivered to the phone are in a "summarized" form consistent with the message length limit and typically small display of a phone. The system does not interfere with existing e-mail accounts but delivers to a user, via his or her digital phone, a notification that an e-mail message is waiting for the user, along with some basic information about the message such as the identity of the sender, the

10   time the message was sent, the subject and a truncated version of the main text. The user can retrieve the full message, with attachments, when access to an appropriate communications device is available. Alternatively, the user may call in to an interactive voice response server which is interfaced to the e-mail forwarding system, to obtain text-to-speech playback of e-mail messages. Optionally, the user may then dictate an immediate response to the IVR server which is then is

15   returned to the sender as a voice file attachment in a reply e-mail.

The system pulls e-mail messages from servers, stores a minimal set of records in a database, and sends the summarized e-mail message to the phone using the delivery mechanism prescribed by the operator of the mobile telephone network to which the user subscribes. User's define, at the aforesaid Web location, rules which allow the system to determine which e-mail messages to

20   summarize and forward, to control the amount of messaging traffic to the phone.

For v-mail, an indication is delivered to the user's digital mobile phone that a message has been left for the user; he can call in to his v-mail service to retrieve messages or summaries.

According to a first aspect of the invention, therefore, there is provided a system for delivering electronic messaging to digital mobile phones. The system has a retrieval subsystem

25   which retrieves a copy of electronic messages from a user's In box on an e-mail server; a message summarizing subsystem which extracts from said messages summarizing information and reformats said information in a manner suitable for presentation to a user's digital phone; and a delivery subsystem which delivers the reformatted information as message summaries to a system that transmits said summaries to the user's digital phone. Preferably, the system further includes a

30   message filtering subsystem which selects from the retrieved messages, for summarizing and

delivery, only those messages which satisfy criteria established by filtering rules selected prior to retrieval by the user. The system also preferably generates and includes with each message summary, for display on the user's digital phone, a message identifier which may be used to retrieve a full or fuller copy of the e-mail. This may be accomplished by further including with the system

5   an interactive voice response (IVR) subsystem. The IVR subsystem may include means for receiving from the user's digital phone a message identifier and an instruction (e.g., a menu selection) to play back the full text of the message associated with that message identifier (which may, and normally will, be different from the message number assigned by the e-mail server) ; and a text-to-speech unit which receives the full text of the message associated with the message identifier

10   and processes the text into speech which is then played back to the user's phone. There may optionally be included, along with or separate from the full text retrieval, as part of the IVR subsystem, means for receiving a message identifier for an e-mail message selected by the user; means for creating a digitized voice response file containing the user's voice response to the message; means for generating a reply e-mail in response to the identified e-mail message and

15   appending thereto as an attachment said digitized voice response file; and means for sending the reply e-mail to an e-mail address derived from the identified E-mail message.

Such a system may monitor multiple e-mail accounts for a single user as well as manage the accounts of many users. Therefore, in another aspect the system may include a database of information relating to a user's enrolled e-mail accounts and the retrieval subsystem then may

20   repetitively poll those accounts for new messages in their In boxes. The rate of polling an account may e a function of the E-mail activity of the account.

Preferably, the system also includes a user account administration server accessible to the user via the global Internet and allowing the user to manage the user to enroll e-mail accounts and establish and administer filtering rules applied to messages retrieved from those accounts. This

25   leaves the user's original e-mail intact at his accounts' e-mail servers, with all filtering and forwarding being done by the system described herein.

As another aspect of the invention, there is provided, by itself or along with the foregoing aspects and features, a subsystem for receiving from a voice mail system a data set indicating that a voice mail has been received by a telephone the user has enrolled.

30   According to another aspect of the invention, there is provided a method for delivering

electronic messaging to digital mobile phones. A copy is retrieved of the electronic messages in a user's In box on an e-mail server; message summarizing information is extracted and reformatted in a manner suitable for presentation to a user's digital phone; the reformatted information is then delivered as message summaries to a system that transmits said summaries to the user's digital

5   phone. Preferably, the method further includes a step of selecting from the retrieved messages, for summarizing and delivery, only those messages which satisfy criteria established by filtering rules selected prior to retrieval by the user. The method also preferably generates and includes with each message summary, for display on the user's digital phone, a message identifier which may be used to retrieve a full or fuller copy of the e-mail. This may be accomplished using an interactive voice

10   response (IVR) subsystem. The method may include operating the IVR subsystem to receive from the user's digital phone a message identifier and an instruction (e.g., a menu selection) to play back the full text of the message associated with that message identifier (which may, and normally will, be different from the message number assigned by the e-mail server); and receiving in a text-to-speech unit the full text of the message associated with the message identifier, processing the text

15   into speech and playing back that speech to the user's phone. There may optionally be included the steps of, along with or separate from the full text retrieval, receiving a message identifier for an e-mail message selected by the user; creating a digitized voice response file containing the user's voice response to the message; generating a reply e-mail in response to the identified e-mail message and appending thereto as an attachment said digitized voice response file; and sending the reply e-mail to

20   an e-mail address derived from the identified E-mail message.

In another aspect, the method may establishing a database of information relating to a user's enrolled e-mail accounts and repetitively polling those accounts for new messages in their In boxes. The rate of polling an account may be a function of the E-mail activity of the account.

Preferably, the method includes allowing the user to manage the enrollment of e-mail

25   accounts and establishing and administering filtering rules applied to messages retrieved from those accounts, via a web browser.

These and other features and advantages of the present invention will become apparent from the following detailed description, which should be read in conjunction with the accompanying drawing.

30

Brief Description of the Drawing

In the drawing,

5   Fig. 1 is a block diagram of a first exemplary embodiment of a messaging system according to the invention, for delivering e-mail notifications and for forwarding e-mail messages to mobile digital phones;

Fig. 2 is a block diagram of a second exemplary embodiment of a messaging system according to

10   the invention, for delivering e-mail and v-mail notifications and for forwarding e-mail messages to mobile digital phones;

Fig. 3 is a system block diagram of the embodiment of Fig. 2, further illustrating an architecture useful and envisioned for the main server and IVR server and further showing the communication

15   paths with the main database of the system; and

Fig. 4 is an illustration of the voice menu and option selection structure which may, for example, be presented to the user when calling in to the IVR server of Figs. 2 and 3.

20

Detailed Description

The system may be implemented in a number of ways. In one aspect, the system may have five primary components, or subsystems: configuration tools to allow the user or a customer service representative to modify user and configuration data; a framework and set of interfaces to monitor

25   user e-mail accounts and retrieve messages; a mechanism to filter e-mail messages and generate e-mail notifications; a framework and set of interfaces to deliver message data to user phones; and a database or mechanism for storing and retrieving application information, user information, configuration information and other relevant data. These subsystems and their interaction will be discussed below.

30   Referring to Fig. 1, there is shown in block diagram form a depiction of the architecture of a

first exemplary embodiment of a system according to the invention, for providing e-mail notification

and delivery only. An e-mail notification and delivery engine 10 sits between an e-mail message

retrieval interface 12, a mobile phone system interface 14 and a configuration interface 16. The

engine 10 has an Internet e-mail standards support component 22 through which the engine

5   communicates with the Internet 24 to reach ISP's and corporate e-mail systems 26; preferably a

corporate e-mail standards support component 28 through which the engine communicates with

corporate e-mail systems 32 which employ Internet-standard protocols; and, if needed, a proprietary

e-mail standards support component 34 through which the engine communicates with corporate e-

mail systems 36 which employ proprietary communications protocols over corporate LANs 38.

10   Engine 10 further may have carrier data delivery interfaces 42 for communicating with and through

proprietary mobile messaging systems 44; carrier data delivery interfaces 46 for communicating with

and through standard protocols such as SMPP, SMTP, TAP, etc. to a standard message delivery

system (SMSC) 48; and/or a customer service interface (API) 52 for communicating with a Web-

based administration application 54 and, possibly, a phone carrier's customer service

15   representatives' computer system 56. The engine 10 further has a subscriber e-mail systems

database 58 which contains all of the relevant data linking users to their accounts, carriers, filters,

rules, and so forth.

The user may enter all necessary administrative information via a computer running a

conventional Web browser 62 which communicates over the Internet with a Web-based

20   administration server 54 for providing to the database 58 via API 52 the data needed by the system.

This data will include account identification, rules, etc. as hereinafter described in greater detail. a

carrier's customer service representatives (CSRs) also may enter certain data or make inquiries via

system 56, initiated by a representative or requested by a user via a conventional call from a

telephone 64. Messaging to and from the user's mobile phone 66 occurs over a wireless network

25   represented by tower 68 and may involve one or more of messaging system 44, SMSC 46 or

customer service representatives at 56.

Configuration Tools

To enable a subscriber to have notifications and summaries forwarded, the system must be

30   configured with specific information which is retained in a store or database 58. Each end user (also

known as a subscriber) will have data stored in the database 58. This data includes the user's e-mail

account information (for one or more accounts), information as to how each account is accessed
(including login identification and password), the destination address (e.g., URL) to which e-mail
notifications will be sent, the data channel or interface required to be used to deliver them, and some
basic user information such as name and address. The account management and configuration
5   interface allows users to add, delete, edit, disable, or enable source e-mail accounts in the database.
For each e-mail account, certain data is stored, such as the application's user identification code, the
e-mail user's identification code, the user's password, the e-mail server type and an indication as to
how the server may be accessed.

10   Retrieval Methods

The system may access a user's e-mail account and system via the Internet through a dial-up
connection to a corporate or private local area network (LAN), or via a proprietary network or dial-
up interface. Specific interfaces may be added as required, it being within the skill of those trained
in data communications to design and build such interfaces. These interfaces will allow the system
15   to check a user's e-mail account for new messages and to pass them along to the filtering and
summarizing mechanisms.

Filtering and Summarizing

The filtering and summarizing mechanism will determine if the message should be
20   forwarded based upon any filtering rules the user or CSR has configured for the user's account. a
rule may instruct the system only to notify the user when an external e-mail contains, or does not
contain, a user-specified word in a message field or in the body of the message itself; or a rule may
instruct the system only, or never, to notify him or her when mail came from a user-specified sender;
or a rule may instruct the system only to notify the user of high priority messages. If a message
25   satisfies the criteria established in the user's rules for the account, it will be summarized by
extracting an amount of text (e.g., 100 characters) from the text body of the message. The
summarized message, with information from the "from" and "subject" fields, as well as the time
sent, is then passed to the delivery mechanism. To minimize character "overhead", the "from"
information is preceded only by "F:" and the "subject" information is preceded only by "S:". The
30   "to" field, "cc" field and other less significant fields are not transmitted.

Delivery Methods

The delivery mechanism consists of a framework that allows the delivery of a text data message to the phone user. The phone user has the ability to view, on demand, the text summary for the e-mail message on the phone. The delivery mechanism framework allows the system to work
5   with any mobile carrier's standard and proprietary systems for messaging and data delivery to phones.

Engine

The main system performs the following steps: (1) it gets user information from the
10   database, associated e-mail server information on the location of the user's e-mail accounts, data specifying where to send messages to the user and whether (or on what conditions) to send them; (2) it polls those e-mail servers for the user and retrieves new messages specified for the user; (3) it evaluates each new message against the rules established for the account; (4) for messages satisfying the rules, summarizes those messages and sends them and notifications to the user's
15   digital mobile phone via the appropriate data and messaging interfaces specified for the user in the database; (5) it updates the database to keep a record of the mail messages that have been processed; and (6) it repeats these steps.

Another embodiment of an exemplary system according to the invention is shown in Fig. 2, for providing both e-mail and v-mail notification and delivery functions. At the "heart" of system 70
20   is a computer 72 which acts as a main server and database and comprises an e-mail and v-mail paging notification and delivery engine, much like engine 10 of Fig. 1. The computer 72 is connected to communicate via the world-wide web 24, to which a subscriber also may be connected to communicate via a computer running a conventional browser program 62. The computer 72 is also connected to appropriate e-mail servers 78 via an appropriate communications media 82 and to
25   a short message service network 84. An interactive voice response (IVR) server 86 also intercommunicates with the main server 72 via a suitable communications channel 88 such as a LAN or WAN. When a voice mail notification is issued by a voice mail system 92 over (for example) the public switched telephone network (PSTN) 94 or other communications path to the IVR server 86, the IVR server issues to the main server, via channel 88, a message indicating that a
30   voice mail message has been left for the user, together with certain identification information relating to that message. In turn, the server 72 sends an SMS message to the user's digital phone 66,

indicating the availability of a v-mail message. The user can retrieve the message by calling the IVR server via his carrier's network 92.

When the user calls in to the IVR server, the IVR server delivers a voice menu message providing to the caller, allowing the caller to select from a list of available actions which may be
5   desired. These available actions preferably include playback of voice mail notifications and text-to-speech playback of e-mail notifications and e-mail message text, on user demand. For example, the user may be given the option of entering the identification number of a message to be read out (i.e., played back in voice), in which event the IVR server retrieves the message text from the main server and database and then plays it over the phone to the user through a text-to-speech system.
10   Alternatively, the user may be given the option to hear a list of unread (or read) e-mails (or both), in which event the IVR server retrieves from the main server and database a string of e-mail notifications which are played back through a text-to-speech converter. Preferably the user may interrupt the playback at any time to obtain a full-text voice playback of a selected message.

Thus the system will be seen to enable a variety of operations, all or most of which need not
15   be present at the same time. These operations include allowing mobile phone subscribers to: receive textual voice mail notifications from non-integrated voice mail accounts; receive textual e-mail summaries from multiple e-mail accounts; dial in through an interactive voice response (IVR) menu to (a) hear the entire text of a specific e-mail message, (b) hear a text to speech conversion of all e-mail summaries, (c) listen to audio files attached to an e-mail messages, (d) reply to e-mail
20   messages with an audio file attached to an e-mail response, (e) navigate during the playing of both full e-mail text and summaries to replay, skip to the end of the message, play the full text during a summary, and return to the main menu, in an emulated environment based on a user's choice of PBX; (f) hear the status of all e-mail accounts and globally enable or disable the e-mail notifications; (g) change the password; (h) check or set the PBX emulation option; (i) create a new subscriber
25   account, then administer e-mail and Voice Mail notifications using a Web browser interface; (j) login using a mobile telephone number and password, then administer e-mail and voice mail notifications using a Web browser interface; (k) view a variety of usage characteristics by day, month, and year; and (l) exit to the home page.

Preferably, the system includes a variety of features designed for use by a mobile phone carrier's
30   customer service representatives, also. These features (not all of which need be present) may, for example, allow CSRs to: provision accounts using a Web browser interface to login as a CSR with a

user identification (ID) and password; login and create a new user, then administer e-mail and voice

mail notifications on behalf of the new user; find an existing user by mobile telephone number,

name or account number and administer e-mail and voice mail notifications on behalf of the existing

user or delete the subscriber; view a variety of single subscriber usage characteristics by day, month,

5   and year; view a variety of system-wide subscriber usage characteristics by day, month, and year;

administer CSR accounts including viewing CSR users, editing CSR users, creating new CSR users,

deleting existing CSR users; link to active SMNP and administer the system; setup system-wide e-

mail filters to be used by the subscribers if desired; and exit to the home page.

10   E-mail Notification

        A process executing at the main server periodically attempts to log into pre-defined POP3-

compatible subscriber e-mail accounts and checks for new e-mail. While it would be possible for

the process to log into each user's e-mail accounts each period, this is unnecessarily inefficient.

Instead, preferably, the process may determine a priority for each user and use the priority as the

15   basis for determining how often to check the user's accounts. there are many suitable ways to

determine priorities. For example, a user's priority may be roughly equated to the number of Emails

the user received during some recent period. Users with heavier traffic will have their accounts

checked more frequently than users who experience lesser traffic volumes. The number of priority

levels may be configurable by a system administrator or fixed or algorithmically established; three

20   levels are believed to be appropriate in most systems.

        If the process finds new mail for a user, it downloads summary information for each new

message, stores this information into the main database, and increases the user's priority unless the

user's account is already at the highest priority. (Note: message bodies are presumed to not be stored

in the database, though it would be possible, with enough memory, to do so.) The process also

25   generates a message to an external gateway that causes the delivery of a short text notification

message to the subscriber's mobile phone.

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All user (e-mail notification) accounts in the main database are provided a status code. Accounts with a suitable status (e.g., "Enabled") and a priority equal to or higher than a then-current priority are polled by the process each polling period. Each "active" user is assigned an available process resource. The resource connects to the subscriber-specified POP3 Mail server, typically using the TCP/IP protocol, and attempts to log on with the subscriber-specified username (ID) and password. If the system is running behind a firewall that disallows access to external POP servers, the system can connect to the outside world via a proxy server.

If the logon fails, an error code is returned indicating an appropriate error condition, which is logged. Error conditions may include, for example, one of: "Host Unreachable", "Invalid User ID or Password" or "Mailbox Busy". A returned code of "Invalid User ID or Password" will causes the system to mark the account as "Disabled", send the subscriber a warning message, and return to the polling activity. A returned code of "Host Unreachable" or "Mailbox Busy" will cause this login attempt to be aborted and control to be returned to the polling activity without further action. The unaccessed e-mail account is eligible to be checked during the next periodic pass of the account.

Upon successfully logging in, the resource will determine if there are any e-mails in the account In box. If there are none, the system logs out of the external e-mail account and returns to the polling search. If there are messages, the number of messages and the size of the mail box are compared to those encountered when the In box was last checked. If they are different, the system will process this account; if they are the same, the system will check to see if a preset "inactivity" threshold has been reached. If the threshold has been reached, the system will process the account and if there is still nothing new, the user's priority will be downgraded.

According to convention, an e-mail system tags each e-mail message with a unique ID, called the UIDL. When processing an account, the system will attempt to retrieve the UIDLs for each message in the account's In box. Each UIDL will be compared to the list of UIDLs stored in the main database as known to exist for the external e-mail account being searched. If a message UIDL exists in the database, no action is taken; if not, it is assumed that this is a new message. When a new message is found, the system retrieves its summary text. (For implementation currently, though this may change at a later date, only the first few lines of the message are retrieved since there is a limit to the number of characters that can be sent to a mobile device. The system tests the POP3 server to see if it supports the "TOP" command; if not, the entire message is retrieved. If the "TOP" command returns a set of valid headers but no message text, it is assumed

that the text of the message is buried below an attachment. For this reason the entire message is retrieved.) Each new message is assigned a message identifier, MSG ID, by the system. a record of the message's MSG ID, UIDL, the system's user id, account name, subject, sender and recipient is stored in the database. a list of all the new messages for that account are stored in the main database.

5   When all of the new messages are processed, the system logs off from the external POP3 mail server for the user's account. The process updates the UIDL listing in the main database with the current UIDL listing gained for the external e-mail account's In box. This update assures that messages read and/or deleted by the subscriber are removed from the main system database.

Each new notification message is formatted (or reformatted) appropriately and sent to the

10   subscriber's mobile phone via the selected and configured outbound messaging protocol indicated for that phone in the main database. a record of all messages sent is logged and the resource terminates action on this account.

The system also may accept a pre-defined data message "page" from external voice-mail services. When a page is received by the IVR system, it sends the data to a process (executing in the

15   main server) that stores this information in the main database. The process also generates a message to an external gateway that causes the delivery of a notification message to the subscriber's mobile phone. a voice mail notification IVR session answers the line when an external voice mail service provider dials into a pre-defined telephone number provided to the voice mail service provider. The external voice mail system will pass the subscriber's identification code and password, if needed,

20   followed optionally by the "#" sign (or other predefined symbol) and again optionally by any pass-thru data. The session is completed and the call is dropped. To notify the user, the IVR subsystem sends a request to a process at the main server (which may be referred to as the "Voice Mail Notification Server") consisting of a protocol header the subscriber's voice mail identification code, and the pass-thru data if present. The process attempts to find in the main database the subscriber

25   account corresponding to the identification code. If a subscriber is not found, an error is logged and no further action is taken. If a subscriber is found, the process generates a message to be sent to the subscriber's mobile phone. a record of the message is logged. The resource then terminates action on this voice mail paging notification.

The text-to-speech IVR application formulates a message and sends it to the text-to-speech

30   server. This message contains the protocol header, the mobile phone number and the password. Upon receipt of a request, the text-to-speech server attempts to process the request by logging onto

the database with the supplied mobile phone number and password. If this fails, an error code is returned to the client.

There are twelve types of action the text-to-speech IVR and the text-to-speech server can perform: (1) list all the messages in all of the current user's mail boxes, (2) listen to a specific
5 message, (3) log the session in the database, (4) respond to a message, (5) hide a message so that it is not included in the list option again, (6) show (i.e., unhide) all hidden messages, (7) get the status of all configured accounts for the current user, (8) logon and validate the password, (9) change the PBX emulation type, (10) change the current user's password, (11) enable all account activity for the current user, and (12) disable all account activity for the current user.

10 In Summary Listing playback mode, the text-to-speech server generates a list of messages from the database "messages" table and formulates a response consisting of the number of messages the user has and, for each message, its subject and sender. The PBX emulation type is retrieved at this stage. This response is sent to the text-to-speech IVR application. The response is then converted to speech and read to the subscriber, who can navigate as detailed elsewhere. In Full Text
15 playback mode, when the user chooses a message ID, a message consisting of a protocol header, a mobile phone number, a password and a "MSG ID" (message identifier) is sent to the text-to-speech server. The server validates the request, logs onto the database and attempts to find the record (from the "messages" table) that corresponds to the user ID (which is returned by the logon routine) and "MSG ID" entered. If no record exists, an error is returned to the text-to-speech IVR application and
20 the subscriber is informed of the error. If a record exists, the e-mail server logs on to the POP3 server specified in the record data.

If logon is successful, the e-mail server issues a series of commands to retrieve the specified message in its entirety. The message is cleaned up so that its headers are stored in memory and only the text portion of the message (including attachment file names and audio attachments but not non-
25 audio attachments) is processed. At this point the server logs off from the POP3 server. The message's body and subject are formatted to be text-to-speech "friendly" and then are sent to the text-to-speech IVR application.

When a user hangs up for any reason, the IVR preferably sends a message to the server with four parameters: phone number, start time, end time, messages (or partial messages) read. The
30 server may use this information to log the minutes of use, number of calls and number of messages read per user per time period.

After (or while) listening to a specific message, the user can choose to respond to it. A recording of the user's voice is made by the IVR subsystem and, after confirmation, it is sent to the "reply-to" address contained in the original message (or the "from" address if no "reply-to" address is available) as an attached file in a widely accepted or previously agreed format, such as the ".wav" format. a record of the response is logged in the database.

A user also can elect to "hide" a message during listing or playback. This causes the message to be marked as "hidden" in the "messages" table of the database, at which point it becomes invisible to the IVR application. The message is not deleted from the POP server, though. Conversely, a user can elect to unhide all his hidden messages. This unhides (i.e., reveals or shows) all of his messages in the "messages" table so they become visible to the IVR.

To perform the log on and validate operation, the IVR can send a request to the server to validate the user's mobile phone number and password. No other action is taken.

A user also can change his PBX emulation type via the IVR unit. a pre-defined list of PBX manufacturers and types is read to the user so he can make his choice. The selected PBX type defines which keys perform which actions during navigation.

The password for the IVR subsystem (which is the same as the password for the Web interface) can be changed via the IVR, also.

A user can opt to enable all of his configured external POP accounts using the IVR unit. Once enabled, the accounts will be polled by the mail process in the normal way.

A user can opt to disable all of his configured external POP accounts using the IVR. Disabled accounts are not polled by the main process. A user may choose this option, for example, if he finds himself outside of his phone carrier's digital coverage area for an extended period and does not want to get "flooded" with old messages when he returns.

For playback of messages, the text to speech IVR application reads the e-mail message text to the subscriber. This continues until the subscriber hangs up. When the subscriber hangs up (or when the line resets for any other reason), the text-to-speech application sends a logging request to the text-to-speech server consisting of a protocol header and a line containing the mobile phone number of the last user, the start time of the call, the end time of the call and a count of the number of messages (or partial messages) read. The text-to-speech server receives the logging request, adds the main system user ID and the length of the call and logs the call in the database's "Text-to-speech server Logging" table.

The subsystem which allows subscribers to manage their own accounts is called the Subscriber Self Provisioning Server. The Subscriber Self Provisioning Server is accessed via a Web browser or the text-to-speech IVR system. The IVR provisioning operation is described elsewhere. The Web browser access functionality is broken into five major areas. First is the home page.

Using a browser, the subscriber connects to the system's home page. If any type of user tries to enter the site from any other page, they will see an error screen asking them to log on first. There are three types of users: new users, existing users, and CSRs. New users are routed to a new user registration screen, while existing users and CSRs are routed to a login screen.

The login screen for existing users and CSRs will prompt the user for his mobile phone number and password or prompt the CSR for a user ID and password. Entering this information and clicking "submit" will login the user. The logon script attempts to find the user by looking up his mobile phone number and password in the database. If no records match this combination an error screen will be presented. If the phone number and password are correct, the subscriber's user ID (not his phone number) is temporarily stored while the user is logged on to the Web interface. a successful log on will take the user to the account management area. On a New User Registration Screen, a new user will enter his or her 10-digit cellular telephone number, a numeric password, address information, (optionally) a carrier and a preferred PBX emulation type. The registration script will check to see that the telephone number has not already registered. If the user is not already registered, a new record will be created in the "users" table of the system database.

For subscriber account management, the main system screen elements are: a display of the mobile phone number; a simple progression of screens to change the password (via a "Change Password" script); a link to the e-mail notification configuration area; a link to the voice mail notification configuration area; a link to the usage area; and an exit to the home page.

The Change Password script verifies the old password is correct, makes sure the two new passwords are the same and then updates the database. The e-mail Notification configuration area allows subscribers to either manage one or many external e-mail accounts or define a new e-mail account. In the Existing Account Management area, each subscriber can configure multiple external accounts identified by a user-defined name. This screen lists each configured account and, for each account individually, give the option to: Enable/Disable - the account status, where enable allows the e-mail notification to occur while disable does not; verify, remove, and edit, including the addition or changing of filters.

Finally, there is an option to add a new account. The New Account Configuration screen will allow subscribers to configure new accounts or to edit the parameters of existing accounts. The screen preferably has the following elements: account name (user defined); POP3-compliant mail server name; e-mail user Id; e-mail password; optionally, a Use Proxy Server (Yes/No) check box; 5 filtering options (i.e., filtering rules); a box to check to use filters system-wide (i.e., across various accounts); and a link that will take the user to a help section.

With respect to filters, each account can have zero, one or many filters to screen and select e-mails to notify to the user. While various filtering rules can readily be conceived, the following are exemplary rules that are believed useful, where "From" refers to the field which identifies the 10 sender, "To" refers to the field which identifies the addressees, "CC" refers to the field which identifies others to whom the message was sent, and "Subject" refers to the field which may contain a sender-generated statement about the subject matter of the message:

ONLY SEND IF From Contains *<text field to be matched>*

DON'T SEND IF From Contains *<text field to be matched>*

15   ONLY SEND IF To Contains *<text field to be matched>*

DON'T SEND IF CC Contains *<text field to be matched>*

ONLY SEND IF CC Contains *<text field to be matched>*

DON'T SEND IF To Contains *<text field to be matched>*

ONLY SEND IF Subject Contains *<text field to be matched>*

20   DON'T SEND IF Subject Contains *<text field to be matched>*

Similar filter rules can be created based on text in the message body, time of original transmission, and so forth.

A similar voice mail notification configuration area may be provided to allow subscribers to 25 manage or define a new account to receive inbound paging notification manage one or many external voice mail server providers.

On an Existing Account Management screen, each subscriber can configure multiple external accounts identified by a user-defined name. This screen may list each configured account and, for each account individually, give the option to: Enable/Disable, Remove, Edit (including adding or 30 changing) filters.

Finally, there may be an option to add a new account. The New Account Configuration

screen will allow subscribers to configure new accounts to be notified about or to edit the parameters of existing accounts. The screen preferably will have the following elements: Account Name (user defined), a password or PIN (Personal Identification Number) - assigned by the system (in "edit" mode, this presumably will be "read-only" data), and a Call Back Number (user supplied).

5   The four main services (E-mail Notification Server, Voice Mail Notification Server, Text-to-speech server and Subscriber Self Provisioning Server) all share the same internal database, main database 72 (or, in the case of the example of Fig. 1, which lacks the v-mail component of the system, comparable database 58). The database 72 contains all of the information that is needed to support the four services and the system logging functions. The Database consists of four different

10   types of data: user information, e-mail notification information, voice mail notification information, external information, and logging information. User Information includes a users table and a csr_users table. E-mail notification information includes an accounts table, a messages table and an email_filters table. Voice- mail notification information includes a voicemail_accounts table. External information includes data defining PBX types (or PABX types), and POP servers

15   identification. Each component subsystem will take care of appropriate logging of information. The kinds of logs generated preferably will include: outgoing message logging; incoming text-to-speech logging; detailed event logging by the e-mail notification server; incoming client request logging by the Voice Mail Notification Server; incoming client request logging by text-to-speech server; and incoming call logging by the IVR applications. Two logging tables are provided. Each outgoing

20   message will be logged in the "Logging" table of the system, which is the first logging table. Each record includes: a user ID; an account ID, a message type identifier (e-mail, voice mail, warning, response), and a time stamp. Incoming text-to-speech messages from the text-to-speech server will be logged in the "Text-to-speech server Logging" table of the database, which is the second logging table. Each record includes: a user ID, duration of the message (in minutes), a message count, and a

25   time stamp.

          The e-mail notification server preferably records a detailed log file. This file will include database, POP3, outbound messaging and general programming events.

          The voice mail notification server preferably records a file containing one record per incoming call. This file will log: the remote IP address, a time stamp, error code, and error text. This

30   file will include database, POP3, outbound messaging and general programming events.

          The text-to-speech server preferably records a file containing one record per incoming call.

This file will log: the remote IP address, a time stamp, an error code and error text. This file will include database, POP3, outbound messaging and general programming events.

Each type of logging can be enabled or disabled "on the fly" via SNMP. Additionally all logging can be enabled or disabled "on the fly" via SNMP.

As depicted in Fig. 3, internal communication with the database is via ODBC-compliant messaging or another appropriate protocol for the Self Provisioning Server, JDBC-compliant messaging or another appropriate protocol for the E-mail Notification Server, Voice Mail Notification Server, and Text-to-speech server. Communications between the IVR applications (e.g., voice mail paging notification and e-mail retrieval) preferably is via TCP/IP sockets. Each server will provide a generic TCP/IP interface for system management (typically via SNMP) and a TCP/IP based system console for viewing current activity.

POP traffic between the e-mail notification server and the remote mail servers will be unencrypted as that is required by an Internet standard (rfc1939). All SMTP traffic will also be unencrypted for the same reason. No record of any message text will be stored by the system. This includes records in the "messages" table, records in the "logging" table and detailed file logging. Since no record of message text is stored by the system, every request for a message to be retrieved will have to go to the remote POP server and pass the security tests imposed by that foreign system.

Traffic between the remote mail server and Text-to-speech server will be unencrypted (see above). Traffic between Text-to-speech server and the IVR system will also be unencrypted since it will be protected by the firewall.

Subscribers log on to the system using their previously defined password and mobile phone number. Once logged on, any ID and passwords required for access to remote POP3 servers will be retrieved from the database.

Configuration Management

A Subscriber will log on to the Web interface using his or her mobile phone number and the previously defined system password. Once successfully logged on, he or she will receive a "cookie" that will tell the system who he or she is. This cookie will expire at some defined point in the future.

For voice mail notification, the text message delivered to the mobile phone preferably takes the following format:

(1) "xyz!" (where "xyz" represents some word, phrase or system name or trademark, or a null string)

(2) Account Name

(3) Callback number

(4) Pass-thru data (optional)

(5) Time stamp

(6) E-mail Notification

The text messages delivered to the mobile phone take the following format:

(1) F: <name of sender>

(2) S: <text contained in the subject>

(3) <IVR callback number>:<message id>

(4) Time stamp

(5) as many message characters as can fit after all of the other fields fill the short text message buffer allowed by the cellular carrier (normally the total message is between 110 and 160 characters).

If the message has an attachment, the name of the attachment will be included in the text message.

To reach the E-mail Retrieval IVR subsystem, the subscriber will dial the system. The first action will be to login with the mobile telephone number and password. Once logged in, the

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subscriber will hear a main menu and be prompted to select to hear a full message associated with a

unique MSG ID, a listing of all e-mail summaries, or the status of each individual e-mail account

plus user options to set the password and PBX type.

If full message playback is selected, the subscriber will hear the text-to-speech conversion of

5   the e-mail message associated with the unique MSG ID. The subscriber can navigate during the

text-to-speech playback, with specific keys on the cellular telephone, to hide a message (i.e., not

hear the message again in the system but not affect the text e-mail in the subscriber's external e-mail

account), replay a message from its beginning, hear the message summary of the previous e-mail in

the subscriber's system Emails, hear the message summary of the next e-mail in the subscriber's

10   system e-mails, or respond by send a voice response to the message. At the end of the message

playback, the call flow returns to the main menu. If the message has an attachment, it will be

announced as part of the message playback. If the attachment is an audio file, the user will have the

option to play it.

When playing a listing of summaries, the subscriber will hear the continuous play of

15   summary e-mail messages in the internal system e-mails, with the listing arranged newest to oldest

received. The subscriber can navigate during the text-to-speech playback, with specific keys on the

cellular telephone, to hear the full message, with the ability to use the navigation keys to "rewind",

"fast forward", or replay, as detailed; hide a message (i.e., mark it to not be heard again in the system

but not affect the text e-mail in the subscriber's external e-mail account); hear the full message of

20   the previous e-mail in the subscriber's system e-mails; or hear the full message of the next e-mail in

the subscriber's system e-mails. At the end of the message summaries playback, the call flow

returns to the main menu.

When listing to account status, the subscriber will hear the status as either enabled or

disabled, of the e-mail notification accounts defined in the internal system. The subscriber can

25   globally change the status of all accounts, with specific keys on the cellular telephone, to

enable an account so the subscriber will receive e-mail notification from that account, or disable the

account so the subscriber will stop receiving e-mail notification from that account until further

notice. After all accounts are enabled or disabled, the subscriber will hear a global status statement

and the call flow returns to the main menu.

30   Having thus described the inventive concepts and illustrative embodiments, it will be

apparent to those skilled in the art that various changes and additions may be made thereto and that other implementations will be within the ability of those skilled in the relevant technology. For example, the features described herein may be utilized singly or in various combinations not specifically illustrated; and the methods discussed herein may be practiced on apparatus other than that shown. Accordingly, the illustrative embodiments are presented y way of example only and not by way of limitation. The invention is limited only as set forth by the appended claims and equivalents thereof.

What is claimed is:

CLAIMS

1. A system for delivering electronic messaging to digital mobile phones, comprising:

5   a retrieval subsystem which retrieves a copy of electronic messages from a user's In box on an e-mail server;

        a message summarizing subsystem which extracts from said messages summarizing information and reformats said information in a manner suitable for presentation to a user's digital phone; and

10   a delivery subsystem which delivers the reformatted information as message summaries to a system that transmits said summaries to the user's digital phone.

2. The system of claim 1 further including a message filtering subsystem which selects from the retrieved messages, for summarizing and delivery, only those messages which satisfy criteria 15 established by filtering rules selected prior to retrieval by the user.

3. The system of claim 2 which generates and includes with each message summary, for display on the user's digital phone, a message identifier.

20   4. The system of claim 3 further including an interactive voice response subsystem including

        means for receiving from the user's digital phone a message identifier and an instruction to play back the full text of the message associated therewith; and

        a text-to-speech unit which receives the full text of the message associated with the message identifier and processes the text into speech which is then played back to the user's phone.

5. The system of claim 3 further including an interactive voice response subsystem including

means for receiving a message identifier for an E-mail message selected by the user;
means for creating a digitized voice response file containing the user's voice response to the message;

5   means for generating a reply e-mail in response to the identified E-mail message and appending thereto as an attachment said digitized voice response file; and

means for sending the reply e-mail to an e-mail address derived from the identified E-mail message.

10 6. The system of claim 1 further including a database of information relating to a user's enrolled E-mail accounts and the retrieval subsystem repetitively polling those accounts for new messages in their In boxes.

7. The system of claim 6 wherein rate of polling an account is a function of the E-mail activity of
15 the account.

8. The system of any of claims 1-7 further including a user account administration server accessible to the user via the global Internet and allowing the user to manage the enrollment of the user's E-mail accounts and establish and administer filtering rules applied to messages retrieved from those
20 accounts.

9. The system of claim 8 further including

a subsystem for receiving from a voice mail system a data set indicating that a voice mail has been received by a telephone the user has enrolled.

10. A method for delivering electronic messaging to digital mobile phones, comprising:

    retrieving a copy of electronic messages from a user's In box on an e-mail server;

    extracting from said messages summarizing information and reformatting said information in a manner suitable for presentation to a user's digital phone; and

5   delivering the reformatted information as message summaries to a system that transmits said summaries to the user's digital phone.

11. The method of claim 10 further including the step of selecting from the retrieved messages, for summarizing and delivery, only those messages which satisfy criteria established by filtering rules

10 selected prior to retrieval by the user.

12. The method of claim 11 which includes the step of generating and including with each message summary, for display on the user's digital phone, a message identifier.

15 13. The method of claim 12 further including the steps of:

    receiving from the user's digital phone a message identifier and an instruction to play back the full text of the message associated therewith; and

    receiving the full text of the message associated with the message identifier and processing the text into speech which is then played back to the user's phone.

20

14. The method of claim 12 further including the steps of:

    receiving a message identifier for an E-mail message selected by the user;

    creating a digitized voice response file containing the user's voice response to the message;

generating a reply e-mail in response to the identified E-mail message and appending thereto as an attachment said digitized voice response file; and

sending the reply e-mail to an e-mail address derived from the identified E-mail message.

5   15. The method of claim 10 further including the steps of:

storing a database of information relating to a user's enrolled E-mail accounts; and

repetitively polling those accounts for new messages in their In boxes.

16. The method of claim 15 wherein rate of polling an account is a function of the E-mail activity of

10   the account.

17. The method of any of claims 10-16 further including the steps of:

providing a user account administration server accessible to the user via the global Internet;
allowing the user to manage the enrollment of the user's E-mail accounts and to establish and

15   administer filtering rules applied to messages retrieved from those accounts.

18. The method of claim 17 further including the step of:

receiving from a voice mail system a data set indicating that a voice mail has been received by a telephone the user has enrolled.
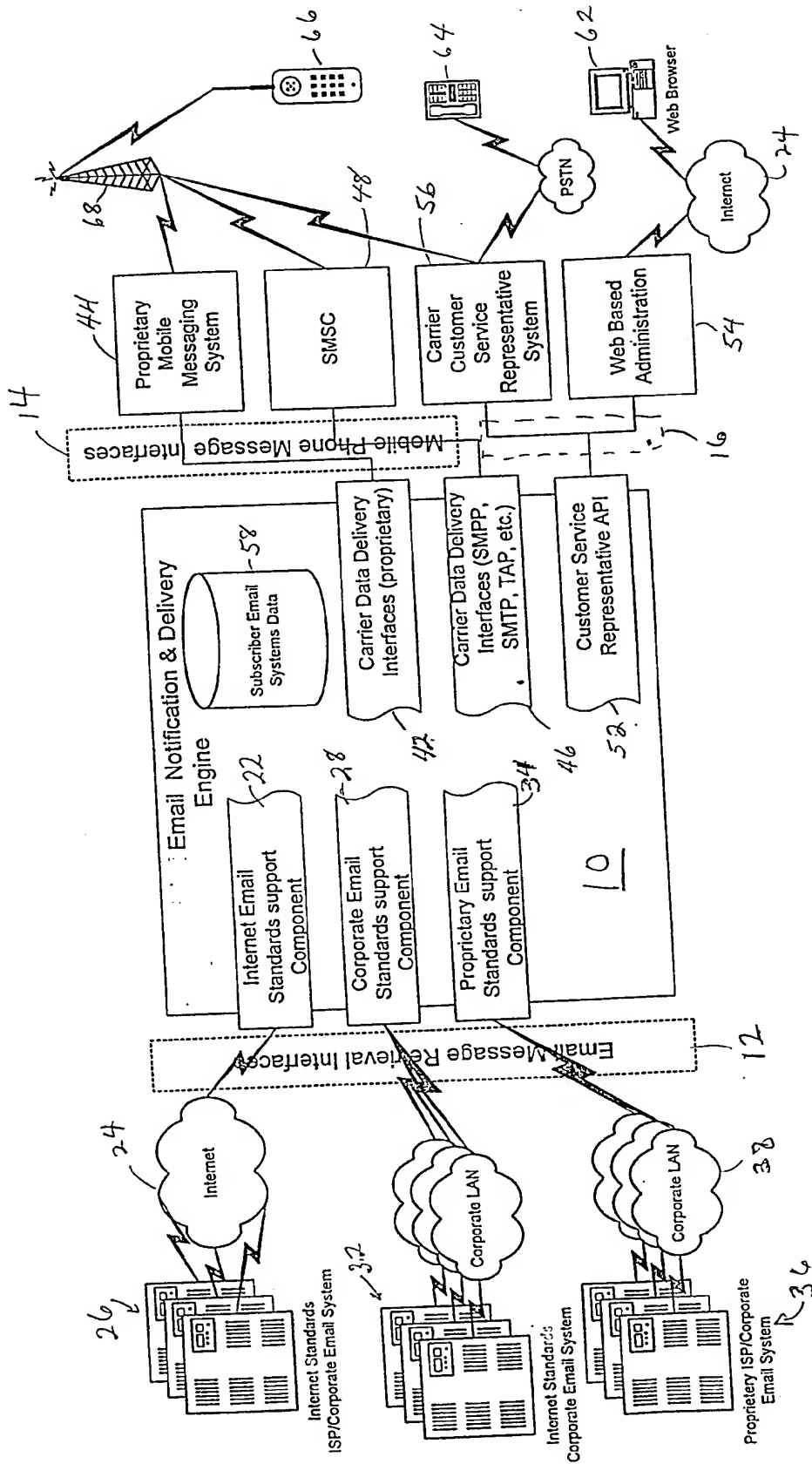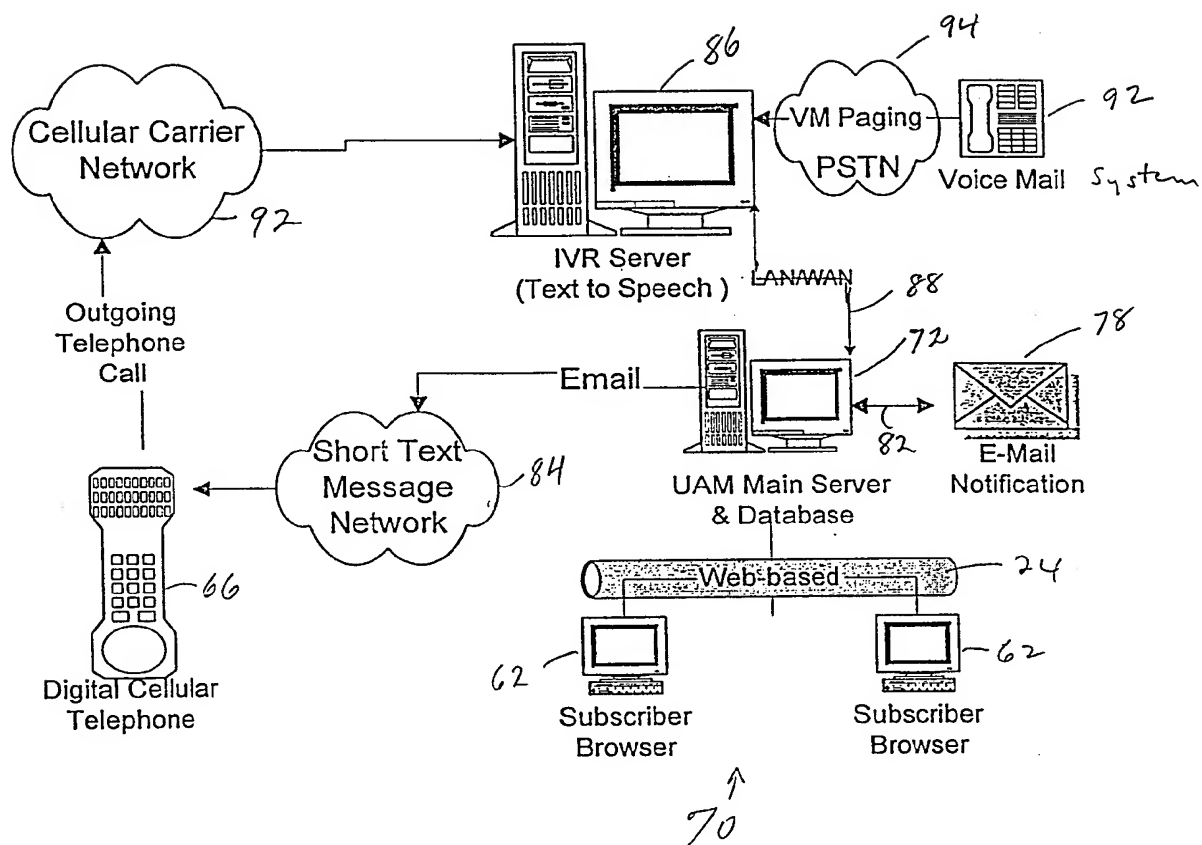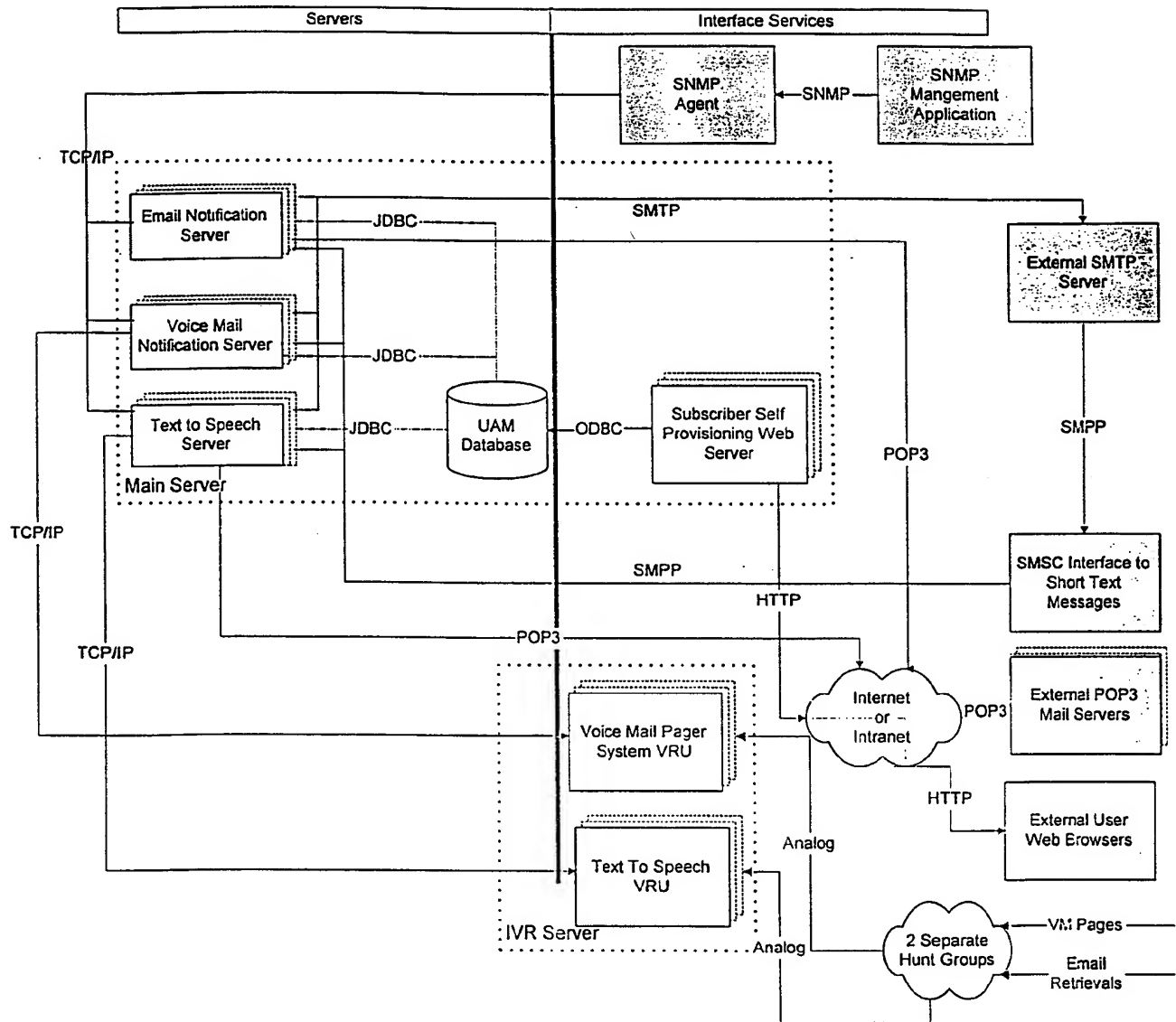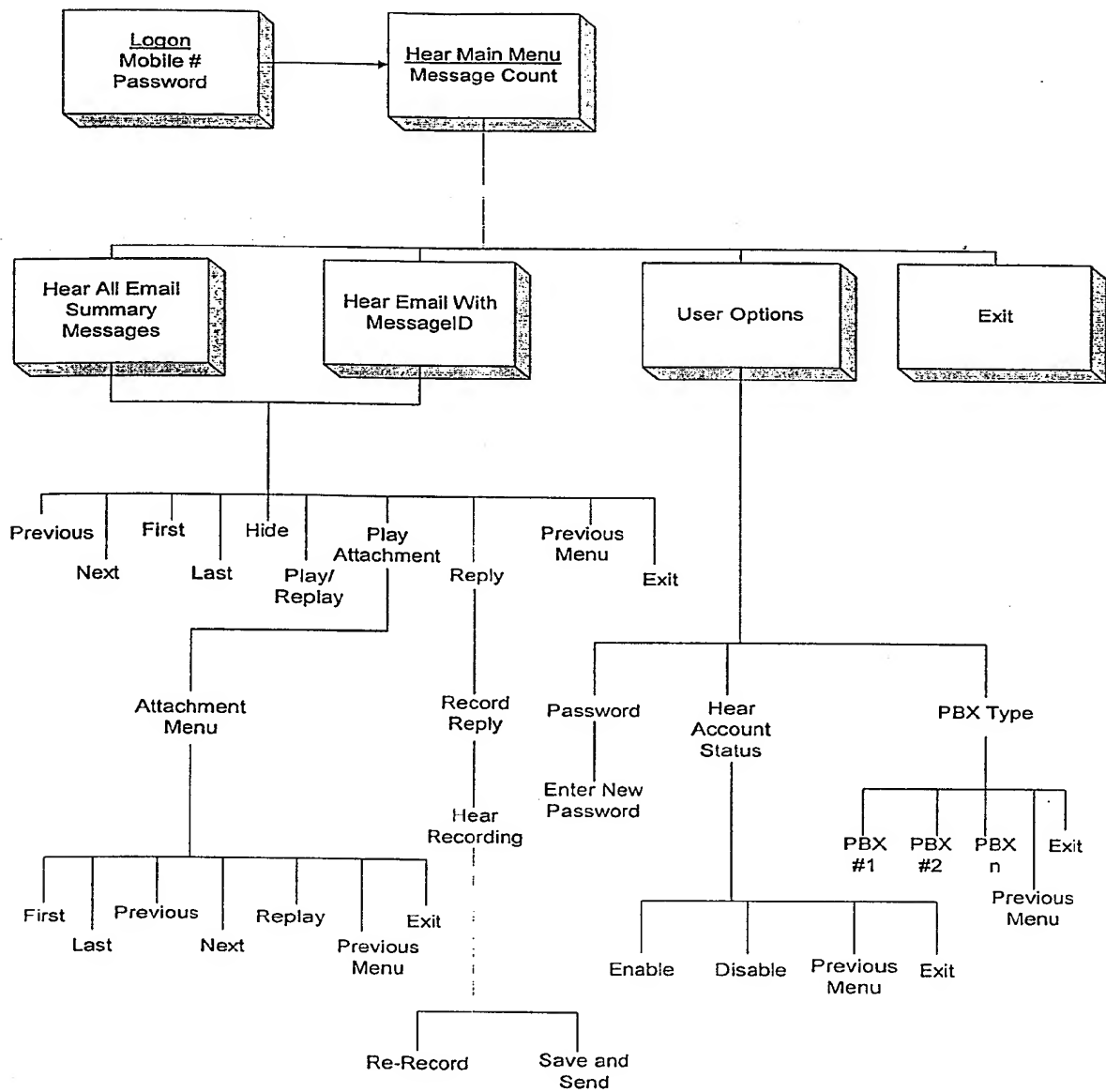
20

FIG. 1

FIG. 2

F I G. 3

```
┌──────────────┐          ┌──────────────┐
│   Logon      │          │ Hear Main Menu│
│  Mobile #    │ ───────▶ │ Message Count │
│  Password    │          │              │
└──────────────┘          └──────────────┘
                                 │
        ┌────────────────┬───────┴────────┬──────────────┐
┌──────────────┐  ┌──────────────┐  ┌──────────────┐  ┌──────────────┐
│ Hear All Email│  │Hear Email With│ │ User Options │  │    Exit      │
│   Summary    │  │  MessageID   │  │              │  │              │
│  Messages    │  │              │  │              │  │              │
└──────────────┘  └──────────────┘  └──────────────┘  └──────────────┘
        │                 │                 │
```

Previous   First   Hide   Play   Previous
    Next   Last   Attachment   Menu
                Play/   Reply   Exit
                Replay

Attachment   Record   Password   Hear   PBX Type
   Menu   Reply   Account
                                  Enter New   Status
                     Hear   Password
                   Recording

                                      PBX   PBX   PBX   Exit
                                      #1   #2   n
                                                    Previous
                                                    Menu

First   Previous   Replay   Exit   Enable   Disable   Previous   Exit
   Last   Next   Previous   Menu
                      Menu

Re-Record   Save and
                 Send

FIG. 4